

REMARKS

Reconsideration and allowance are respectfully requested.

Remarks Regarding Claim Amendments

Claims 2 and 11 are amended to correct informalities. Support for the amendments are in original claims 2 and 11. No new matter is added and entry of the claim amendments is requested.

Remarks Regarding Substitute Specification

Applicants have not amended the Specification in this paper. A substitute Specification, which incorporated previously submitted amendments (i.e., Amendments of January 5, 2006, February 25, 2008 and February 9, 2009 and entered by the Examiner, e.g., on May 8, 2009) is submitted to improve readability. No new matter is added and the entry of the substitute Specification is requested.

Remarks Regarding Claims

Applicants note, with appreciation, that the Examiner has examined claims 2-4 and 11 on the merits. Since claims 2 and 3 are being examined, they are now marked as "previously presented" and "original" to reflect their current status.

Remarks Regarding January 11, 2007 Election of Species

The Examiner has requested that the original elected species of η^5 -(cyclopentadienyl)1,3-bis(2,6-diemthylphenyl)-iminoimidazoline titanium dimethyl on January 11, 2007 be canceled. Applicants hereby respectfully request the cancelation of the elected species η^5 -(cyclopentadienyl)1,3-bis(2,6-diemthylphenyl)-iminoimidazoline titanium dimethyl which was made on January 22, 2007.

Remarks Regarding Section 112

Claims 2-4 and 11 stand rejected as allegedly improper because of improper Markush terminology. Applicants have amended the claims to conform more closely

with Markush terminology. This rejection is moot in view of the claim amendments and its withdrawal is requested.

Remarks Regarding Section 103

A claimed invention is unpatentable if the differences between it and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art. *In re Kahn*, 78 USPQ2d 1329, 1334 (Fed. Cir. 2006) citing *Graham v. John Deere*, 148 USPQ 459 (1966). The *Graham* analysis needs to be made explicitly. *KSR v. Teleflex*, 82 USPQ2d 1385, 1396 (2007). It requires findings of fact and a rational basis for combining the prior art disclosures to produce the claimed invention. See id. (“Often, it will be necessary for a court to look to interrelated teachings of multiple patents . . . and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue”). The use of hindsight reasoning is impermissible. See id. at 1397 (“A factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon ex post reasoning”). Thus, a *prima facie* case under Section 103(a) requires “some rationale, articulation, or reasoned basis to explain why the conclusion of obviousness is correct.” *Kahn* at 1335; see *KSR* at 1396.

Claims 2-4 and 11 stand rejected under 35 U.S.C. 103 as allegedly obvious in view of Hoang (U.S. Patent 6,583,082) and Gillis (WO 97/38019). Applicants traverse.

Acknowledgement of Dr. Doremaele's Declaration is Respectfully
Requested

Applicants note that while the Examiner indicated that the arguments filed February 9, 2009 were fully considered (see, Office Action of May 8, 2009), the Examiner has not acknowledged reading Dr. Doremaele's declaration. Dr. Doremaele's declaration was submitted with the arguments filed February 9, 2009 and further, Dr. Doremaele's declaration was cited numerous times in said arguments.

Acknowledgement by the examiner that she has fully considered Dr. Doremaele's

declaration is respectfully requested. An additional copy of Dr. Doremaele's declaration is submitted with this Amendment for the examiner's convenience."

Applicants's Claimed Invention is Not Obvious in view of the Cited References

Applicants arguments for patentability, presented below, should be read in view of Dr. Doremaele's Declaration.

The claimed invention is directed to a process for the preparation of ethylene/α-olefin/vinyl norbornene in the presence of three components: (1) a catalyst composition comprising a Group IVB metallocene catalyst, (2) an aluminoxane activating compound and (3) 0 - 0.20 mol per mol of the catalyst of a further activating compound.

Applicants agree with the Examiner that Hoang does not teach the copolymerization of (1) ethylene (2) α-olefin and (3) vinyl norbornene. Further, the addition of Gillis to Hoang does not cure the defect of Hoang.

There is no motivation, provided in Hoang or Gillis to produce Applicants claimed invention since Gillis specifically teaches against the use of Applicant's claimed combination by stating "If the metallocene procatalyst is entirely one of formula $(Cp^1R^1_m)R^3_nY_rMX_8$, it is activated with the aforementioned cation-generating cocatalyst". (Page 13, lines 16-19 and page 12, line 23.) The cation-generating cocatalyst comprises a first, second and third component (page 18, lines 9-21), with a second component having at least one aryl group possessing at least one electron-withdrawing substituent (page 18, lines 17, 18). Since Hoang's aluminoxane cocatalyst does not fulfill these requirements, Gilles and Hoang teaches against the combination of the two references.

Furthermore, the claimed invention provides unexpected results over the prior art. Applicants refer the Examiner to Example 4 and Comparative Example C in the Specification. First, applicants would like to point out to the Examiner that the catalyst used in Example 4 and Comparative Example C are comparable. Example 4 and Comparative Example C in the '377 application are comparable because they used highly similar catalyst that are identical once they are in active form. The catalyst for Example 4 is η^5 -(perfluorophenylcyclopentadienyl)(tri-tert-butylphosphinimine)titanium

dimethyl. The catalyst for Comparative Example 4 is η^5 -
(perfluorophenylcyclopentadienyl)(tri-tert-butylphosphinimine)titanium **dichloride**. The
only difference between the two catalysts is the methyl vs. chloride group in the
activatable ligand. An activatable ligand is activatable because aluminoxane will activate
the catalyst by removing this ligand, thus creating an open site for C2, C3 or diene
insertion. Once activated by aluminoxane or borate , the two catalysts are exactly the
same. See attached Declaration, paragraph 9. This can also be learned from Hoang
Col 7 lines 14 – 32, where Cl (line 24) and Me (line 20) are mentioned as "leaving
ligands" and being considered as interchangeable (line 40). For this reason the organo-
metallic compound is often referred to as "procatalyst". **See, Doremaele Declaration,
paragraph 9.**

As the Examiner indicated that the experimental conditions are different,
Applicants submit that the dosed amounts of C2 and C3 have been interchanged. This
obvious error could be concluded from the resulting polymer composition, that could not
be obtained with a C2/C3 ratio of 1139/836 (NL/g), but only with a ratio of 836/1139
(NL/g). If this should still be not convincing one may compare Example 4 with
Comparative Experiment A, in which the same catalyst precursor is used. **See,
Doremaele Declaration, paragraph 10.**

Unexpected results are shown, at least, in the description at page 13, Example 4
verses comparative Experiment C. This section clearly shows that the polymerization of
Example 4 according to the present invention allowed ten times more VNB than a
polymerization in the presence of a borate co-catalyst to obtain the same amount of
branching. **See Doremaele Declaration, paragraph 11.** Furthermore, Example 8
versus Comparative Experiment C shows that under similar conditions and the same
amount of VNB incorporated, the MAO activated sample was hardly branched in terms
of $\Delta\delta$, while the borate activated sample was highly branched in terms of $\Delta\delta$. **See
Doremaele Declaration, paragraph 12.**

The purpose of the claimed invention was to build in a high amount of VNB for
effective curing with peroxide. Contrary to Gillis, the purpose is not to built in VNB to
increase the level of branching. without reactor fouling. Applicants' results, showing

conditions allowing a 10 times more VNB without reactor fouling and without gelling and leading to a degree of branching comparable to that achieved with a ten fold lower amount of VNB are all unexpected. The highest amount of built in VNB in Gillis is disclosed in Experiment 7, where 0.5 mL VNB is dosed. With a VNB density of 0.841 g/ml this corresponds to 0.42 gram VNB. Starting from the presumption that all VNB has been incorporated in 91 gram of polymer, this corresponds with at most 0.46 % VNB in the polymer. This result was not achieved by the prior art and would not be expected to be achieved without the experiments as outlined in the '377 application). **See Doremaele Declaration, paragraph 14.**

Furthermore, Applicants would like to address the Examiner's statement, on page 4 of the November 11, 2007 Office Action, which states that metallocene catalyst 2 with a polar perfluorophenyl substituent on the cyclopentadienyl ring is not representative of the metallocene catalyst of the instant claims. Applicants have reviewed the instant claim 11 as amended by the amendment of November 17, 2008 and determined that metallocene catalyst 2 is indeed a metallocene catalyst of the instant claim 11 Cp is a ligand selected from the group consisting of cyclopentadienyl, substituted cyclopentadienyl, indenyl, substituted indenyl, fluorenlyl and substituted fluorenlyl. A perfluorophenylCp ligand is an example of substituted cyclopentadienyl. It is clear that claim 11, in its current form, reads on metallocene catalyst 2. Therefore, Example 4 is commensurate with the scope of the instant claims. **See Doremaele Declaration, paragraph 15.**

Example 3 shows that even with a very high dosing of VNB, no gelation occurs. Dosing more than 50 mmol/L VNB, which is an extremely high amount, shows higher long chain branching than Example 4 which has lower amounts of VNB dosing. However, Example 10 shows, that by reducing temperature and catalyst, the amount of branching can be brought back to the level of Example 4. Applicants note that these state of the art high amounts of VNB dosing were not possible at all without complete gelation prior to Applicant's invention. **See attached Declaration, paragraph 13.**

Applicants would also like to address the Examiner's comment that Example 3 has a much lower $\Delta\delta$ of 1.5 compared to Example 4 with a $\Delta\delta$ of 9.0. The Examiner

has alleged that the claimed process does not always produce the terpolymer with low level of long chain branching. Applicants note that "low level of long chain branching" is not part of the instant pending claim 4 or 11. The objects of the invention is to produce a polymer with a high VNB content, to have a fast curable EPDM while avoiding gelation in the reactor. Although the degree of branching of Example 3 is higher than that of Example 4, the amount of build in VNB is also 20% higher. This represents a significant advantage as less peroxide is required for curing – thus reducing the overall cost of the process. **See attached Declaration, paragraph 16.**

Withdrawal of the Section 103 rejections is requested because the claims would not have been obvious to one of ordinarily skill in the art when this invention was made and because the claimed process produced unexpected results that would not be expected from a combination of the cited references.

Conclusion

Having fully responded to the pending Office Action, Applicants submit that the claims are in condition for allowance and earnestly solicit an early Notice to that effect. The Examiner is invited to contact the undersigned if additional information is required.

Respectfully submitted,

NIXON & VANDERHYE P.C.

By:



Eric Sinn

Reg. No. 40,177

901 North Glebe Road, 11th Floor
Arlington, VA 22203-1808
Telephone: (703) 816-4000
Facsimile: (703) 816-4100